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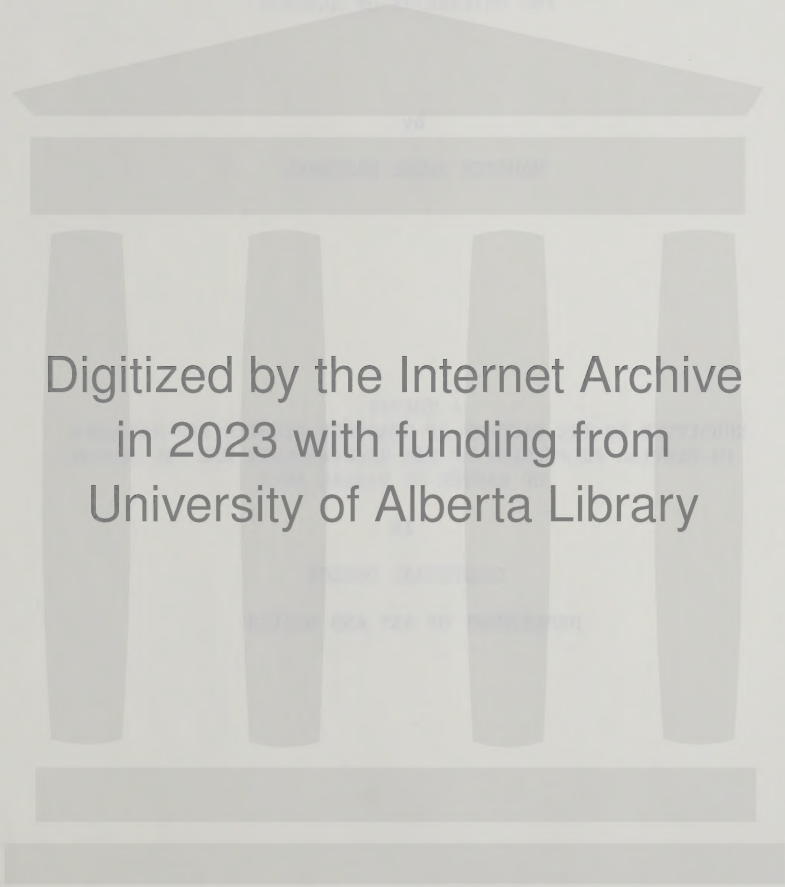

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled:

Final Visual Presentation

submitted by .....Maurice J. Marshall.....

in partial fulfilment of the requirements for the degree of Master of Visual Arts.

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PRODUCT DESIGN AND DEVELOPMENT

1. HOUSING PROJECT

Objectives: Thermal efficiency with the use of off the shelf materials and readily available technology and systems.

Some provision for the future incorporation of solar energy devises.

Design flexibility.

Ease of assembly.

Reasonable cost.

Solutions: Vertical structure (Slide I) results in the internalization of space reducing the surface area of the structure. Heat loss is thus reduced. Cost is also reduced because surfaces separating each level perform double duty as ceilings and floors. Cost is further reduced because less surface area requires proportionally less insulative treatment.

Double sealed thermopane windows are used in all cases (Slide 2). Simple flap type openings are provided for fresh air. All openings are gasketed to prevent cold air infiltration. Redwood frames insure stability, resistance to weathering and thermal properties superior to metal extrusions.

All openings are screened. Glass area is minimized by designing and locating the window openings such that they may be seen out of while sitting or standing without covering more vertical area than is really needed. Cost is kept down by the simplicity of the units and the use of double diamond glass.

The Roof Top Furnace (Slide 3) provides efficient heating. Electronic ignition replaces the inefficient pilot light. Two stage operation (80,000 or 120,000 B.T.U.) supplies heat proportional to demand. Liquid heat exchange medium (Glycol) transfers heat more readily than air. Outside air supplies oxygen to the combustion chamber. Warm air is not therefore taken from within the house and subsequently released through the chimney. The structure thus becomes positively pressurized preventing cold air infiltration, through undetected cracks or openings. A short exhaust stack and powered combustion air supply result in a low stack

temperature requirement - more energy is directed toward inside heating. The roof top location provides the future possibility of solar heat source integration. This location also eliminates the usual basement space obstruction, providing more usable area. An integrated refrigeration system is included for summer air conditioning. Unit cost reductions are afforded by this integration as well as long term savings due to increased operating efficiency.

Reflective roofing material (Slide 3) helps keep the structure cool in summer. It also encourages the build up of snow in winter, for which the roof is stressed. This added snow layer assists in the prevention of heat loss.

Urethane foam filled modular panels (Slide 4) were used for all external surfaces except the foundation. The wall thickness is equal to conventional structures however the superior insulative value of Urethane produces efficiency close to three times that of a conventional wall. Because Urethane is injected into the modules and expands to fill all cavities within, the number of cold spots due to poorly placed insulation are reduced. The modular aspect of the units (Slide 5) permits broad possibilities with respect to construction. That the units are produced using factory methods and that they assemble easily on sight results in savings which offset the cost of insulating materials.

Insulated block construction (Slide 6) is utilized for the foundation. Some improvement is thus enjoyed thermally. An extra row of blocks were placed to raise the basement ceiling in the interest of providing space more suited to prime use. Generous windows also contribute to this objective.

Double entries (porches) are provided both front and rear of the structure producing the effect of airlocks. Thermal losses associated with the use of doors are thus reduced.

Sliding window panels (not shown) are a replacement for conventional curtains, in addition to the usual functions curtains perform, these units are insulated to prevent heat losses associated with windows at night. The units are electrically operated so that most of the windows in the house can be sealed by use of a single control. Reflective surfaces on the outer side of the panels permit reversal of the process to assist cooling the dwelling during daylight hours in summer.

PRODUCT DESIGN AND DEVELOPMENT

2. MOLDED SPEAKER SYSTEMS

Objectives: Low spurious resonance for improved bass response.

A form which lends itself to mass production using readily available materials.

Pleasant appearance.

Solutions: Molded fibreglas hemispheres (Slide 7). The spherical form has particularily good structural resistance to internal changes in pressure. The result of this rigidity is a reduction in the development of spurious resonance produced by the enclosure. Smooth bass response is thus achieved. The shape itself having no undercuts can be produced in fibreglas using simple molding methods.

PRODUCT DESIGN AND DEVELOPMENT

3. FURNITURE PROJECT

Objective: The design of mass producible modules with dimensions that would permit their use in a broad range of situations to be determined by the purchaser. Furniture was considered the prime possibility.

Solution: Four units are provided based on a square twelve inches to a side. The modules have one, two, four and six squares per unit (Slide 8). The resulting shapes relate visually and the various sizes allow the construction of a fairly wide range of useful objects. Standard shelving or planking may be used to span the units. Fastening is achieved with the use of bolts or screws and holes are drilled as required.

PRODUCT DESIGN AND DEVELOPMENT

4. FOLDABLE SAILING TRIMARAN

Objective: To produce a sailing craft capable of brisk performance that is storable in relatively small spaces. The latter consideration is for the benefit of those having insufficient storage area for a conventional boat. Examples would include apartment and condominium dwellers.

Solution: The use of the trimaran configuration provides fast and stable performance (Slides 9 and 10). To store, the pontoons are placed in the cockpit area. Hardware, seating, cross members, dagger board and rudder are placed in the forward hatch (Slide 11). The centrally articulated hull (Slide 12) when folded (Slide 13), provides size reductions which permit storage in a walk-in closet or other relatively small space (Slide 14).

PRODUCT DESIGN AND DEVELOPMENT

5. ELECTRIC GUITAR

Objectives: The development of an instrument which provides unusual comfort, playability and tonal flexibility to the user. It must further lend itself to simple mass production and be durable.

Solution: The prototype (Slide 15) was developed such that its form took into account the fact that most contemporary users place the instrument over the right leg while playing, rather than the left leg which was the former classical tradition. This change of position has resulted in some unhappy postural practices. The classical position permits good posture and an ergonomical relationship which encouraged good technique. Because this is an electric instrument and its body plays little part in the tone, it was possible to take liberties with its shape. These liberties are intended to restore comfort and playing ease to the situation by positioning the playing surfaces back where they may be best used. Critical areas include the relationship between neck and body, the arm rest and leg rest. A padded leather surround encourages further comfort and removes the need for laquering of that area. Since the instrument's controls (Slide 16) are frequently used while playing is in progress, they were placed near the hand. Slide potentiometers were used in place of the usual rotary controls for ease of use. The control module is easily removed for servicing.

Because the position of the pickup to a large part determines the tone of the instrument, it was made to slide to any position between neck and bridge (Slide 17). The units may also be quickly removed and replaced with other units changing the sound still further. A number of pickups may be placed in the unit at one time and they may be moved in relation to one another creating virtually endless variations in timbre. Because pickups are not normally designed to move, there are usually a number of them (2 or 3) with switching provided to select their locations. Because the prototype system moves, more effects are achievable with substantially less hardware.

The plexiglass top, back and face plate provide surfaces whose durability far exceeds that of conventional finishes. The resulting appearance is pleasing and has

many manufacturing advantages. Since the finish is built into the material, that process is virtually eliminated. Vacuum forming replaces the usual wood carving techniques being far faster, simpler and less wasteful.

A built in stand was provided for convenience (Slides 18, 19, and 20). Though separate folding stands are available, none will fit into a guitar case. For this reason they are a nuisance to carry and are seldom used.

In the production version, neck and body frame will be molded from Urethane and fibreglas both having internal support structures where stresses are concentrated. The result will be that finishing work on these parts will be virtually eliminated. Detailed work will be achieved in the making of molds. Subsequent copies will be duplicated quickly and accurately. There will be little wastage of materials. Because manufacturing will mainly involve the use of plastics, the inconsistencies of wood will cease to be a problem. It will no longer be necessary to acquire seasoned wood.

The modular nature of the design will permit the replacement of worn or broken parts. It will further allow the addition of up-dated components should the need arise. If the form or size of the new component is incompatible with the shape of the original top, the unit can easily be replaced with one which has been molded to accept the new system. Since screw fasteners are used in place of glue during assembly up-dating or repairs will be simply achieved.